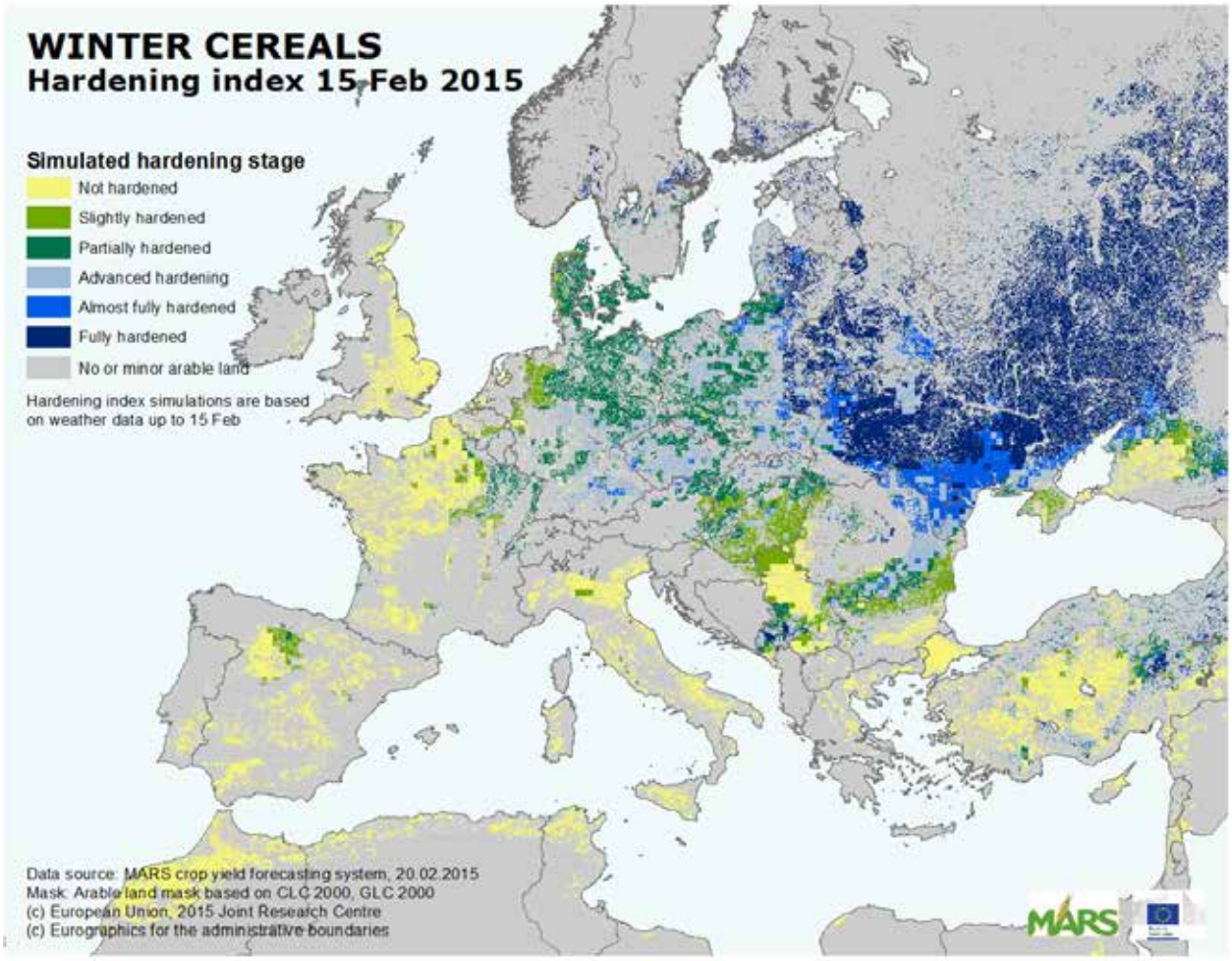
European Commission

Period covered: 1 January – 15 February
Issued: 23 February 2015

Crop monitoring in Europe

MARS Bulletin Vol. 23 No 2 (2015)

Winter cereals remain weakly hardened



To date, this year has been characterised by overall positive thermal anomalies in central, eastern and south-eastern Europe. Colder-than-usual conditions were typical only in south-western regions and Northern Africa. Winter crops are generally in good shape and well developed in the EU due to the mild winter conditions, and our models suggest only local and limited frost-kill damage in Bulgaria, Hungary, Poland and Romania. However, the north-eastern regions of Ukraine and southern Russia appear to be considerably affected by frost kill. Weaker-than-usual hardening continues in western and central Europe, despite a slight improvement in this situation since mid-January. Winter crops have not or have only partially developed tolerance to low temperatures in most of western Europe, the Mediterranean region and the eastern Black Sea region.

1 Agro-meteorological overview

2 Frost-kill analysis

Joint Research Centre

1. Agro-meteorological overview (1 January–15 February)

To date, this year has been characterised by overall positive thermal anomalies in central, eastern and south-eastern Europe. Colder-than-usual conditions were typical only in south-western regions and Northern Africa. Precipitation greatly exceeded the long-term average in the central and eastern regions of the Mediterranean, some coastal areas of the Atlantic Ocean, and northern Russia. Concurrently, a scarcity of rainfall was observed in Spain, France and in a wide strip between the east of England and southern Russia. Winter crops are typically slightly or partially hardened in western and central Europe, but no significant frost-kill damage had occurred in the EU by mid-February.

Observed temperatures

During the period of review (1 January–15 February), overall positive thermal anomalies were experienced in the range of 1 to 5 °C in central and eastern Europe. Above-average temperatures also prevailed in central and northern Italy, most of the Balkan Peninsula, Turkey and Scandinavia, except its most northern regions. Below-average temperatures were dominant in south-western France, the Iberian Peninsula and the Maghreb countries, as well as in Ireland, Scotland and the most northern parts of Russia.

In the first dekad of January (typically between 7 and 10 January), a cold air intrusion invaded the eastern half of Europe. During this period, minimum temperatures decreased between 10 and 15 °C in Poland, Hungary and the northern areas of the Balkan Peninsula. These frost events were insufficient to cause serious frost-kill damage to winter cereals. In the Baltic states, Belarus, eastern Romania, western Ukraine and the interior of Turkey, the measured minima reached – 15 to – 20 °C, whereas in eastern Ukraine and southern Russia temperatures dropped to – 25 and even – 30 °C. In the second and third dekad of January, above-average temperatures prevailed over central regions of Europe, whereas in February the area of relatively mild temperature conditions moved eastward.

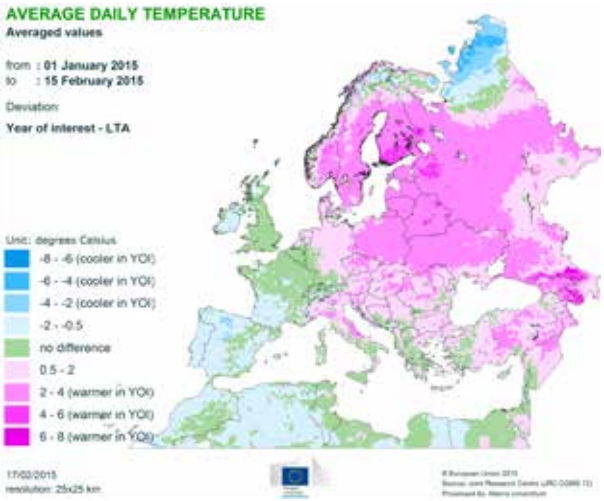
Cumulative active temperatures (Tbase = 0 °C) since 1 January have been close to the long-term average in most areas of eastern and central Europe, but significantly below average in Spain, Portugal, France, Ireland and North Africa. Significantly above-average values (> 50 growing degree days (GDD)) only occurred in some smaller regions of the eastern Mediterranean and along the eastern shore of the Black Sea. This picture changes drastically when taking a longer time scale, since mid-October (typical start of the growing period of winter wheat in many regions), for which well-above average temperature sums (> 100 GDD) extend over a large area from England and southern Sweden to Turkey and western Spain. The winter crops are in good shape and well developed in the EU due to the mild winter conditions. The lower temperatures of the past month partially eased the pest pressure on winter crops in Germany and France.

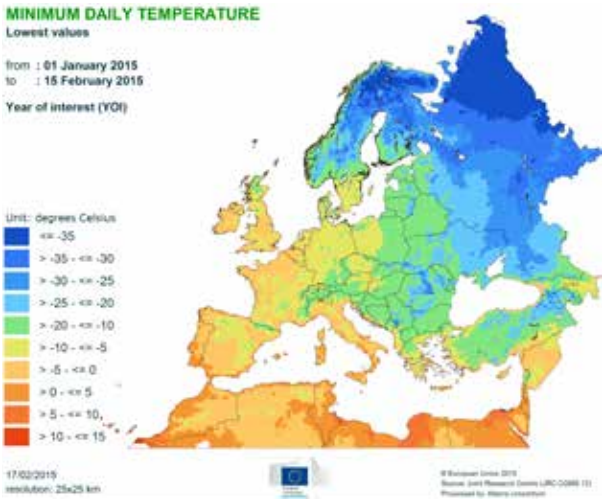
Observed rainfall

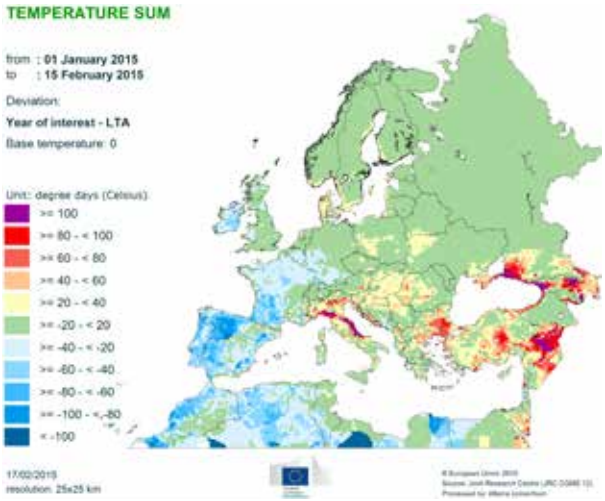
Precipitation showed high spatial and temporal variability during the period of review. Frequent and abundant precipitation (> 200 mm) occurred on the north-western coastal areas of the British Isles and Iberian Peninsula, the western coastline of the Scandinavian and Balkan Peninsulas, and southern Italy. Heavy and persistent rainfall during the last days of January caused flash floods in Greece, Albania and Macedonia. Precipitation was also plentiful in southern and south-western Turkey, Crete, and some coastal areas of the Maghreb countries. Above-average precipitation occurred in large areas of northern Europe. Drier-than-usual weather conditions were typical in France, eastern England, some central regions of Germany as well as in Poland, northern Romania, western Ukraine and southern Russia.

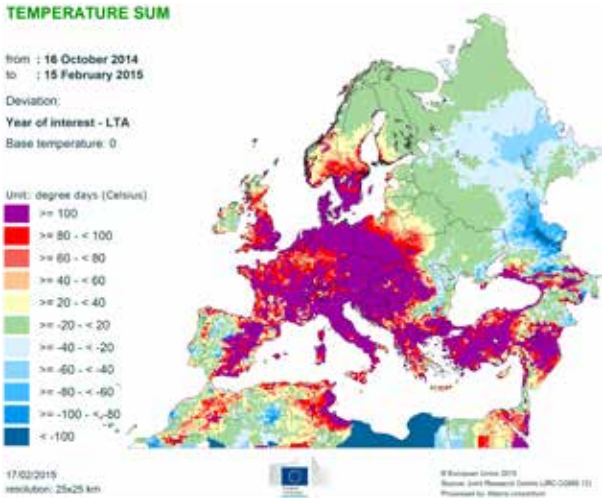
In south-eastern Hungary and some smaller areas of the Balkan Peninsula, where precipitation exceeded the long-term average by 60–280 % and soil conditions were already very wet due to excessive autumn rains and limited infiltration, the additional water surplus led to waterlogging problems. As winter crops are in the dormancy period with limited biological activity, it is difficult to estimate the severity of the waterlogging impact. Considerable damage could occur if waterlogging conditions continue or inundation occurs.

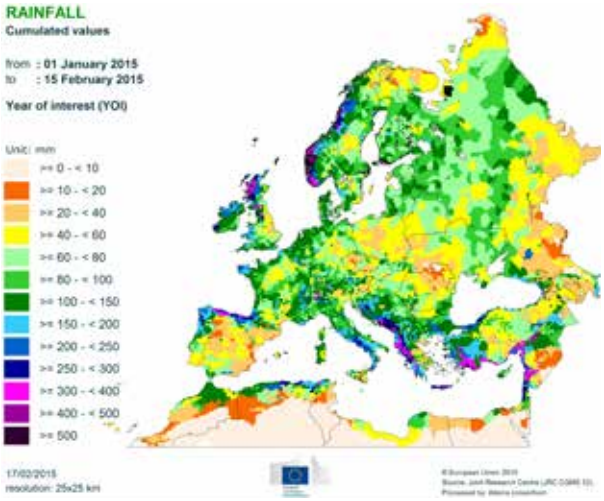
Spain experienced a dry period between mid-December and mid-January, but the rainfall that occurred during the last 30 days has led to a favourable increase in the moisture content of the upper soil layer before the start of sowing of spring cereals.

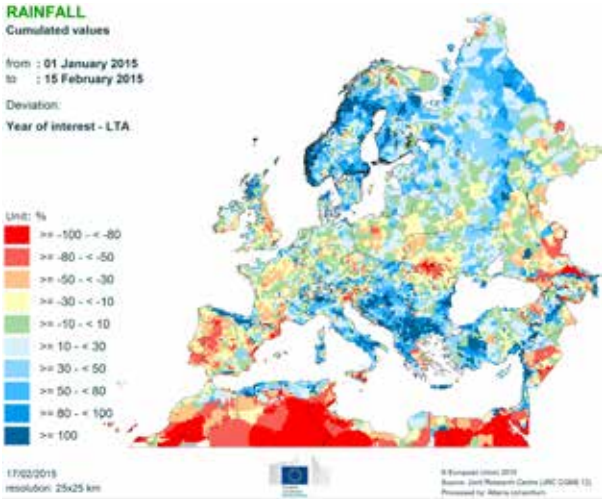

AVERAGE DAILY TEMPERATURE
Averaged values
from : 01 January 2015
to : 15 February 2015
Deviation:
Year of interest - LTA
Unit: degrees Celsius
-8 - -6 (cooler in YOI)
-6 - -4 (cooler in YOI)
-4 - -2 (cooler in YOI)
-2 - -0.5
no difference
0.5 - 2
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
6 - 8 (warmer in YOI)
17/02/2015
resolution: 25x25 km

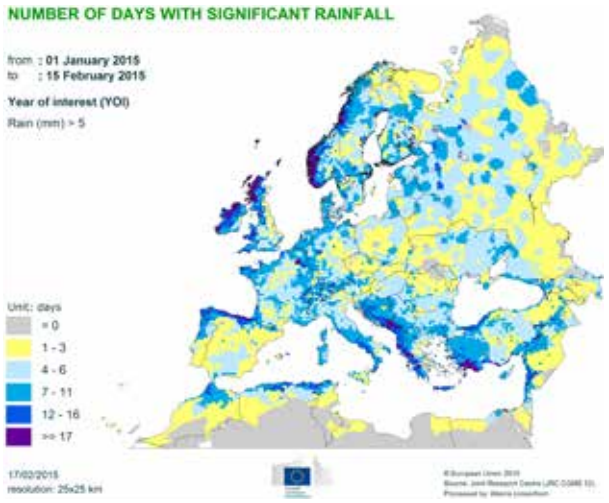

MINIMUM DAILY TEMPERATURE
Lowest values
from : 01 January 2015
to : 15 February 2015
Year of interest (YOI)
Unit: degrees Celsius
<= -35
> -35 - <= -30
> -30 - <= -25
> -25 - <= -20
> -20 - <= -10
> -10 - <= -5
> -5 - <= 0
> 0 - <= 5
> 5 - <= 10
> 10 - <= 15
17/02/2015
resolution: 25x25 km

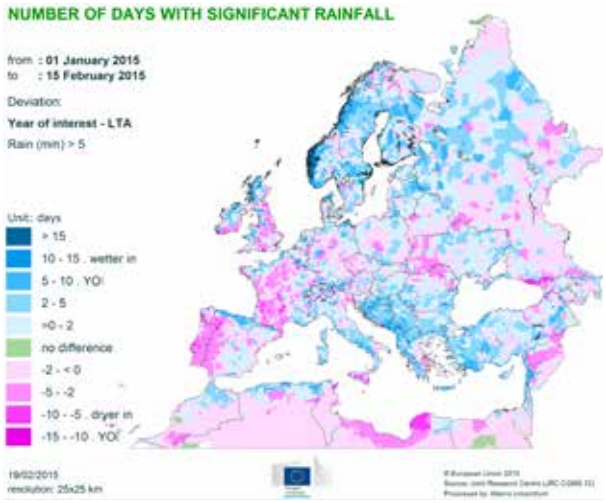

TEMPERATURE SUM
from : 01 January 2015
to : 15 February 2015
Deviation:
Year of interest - LTA
Base temperature: 0
Unit: degree days (Celsius)
>= 100
>= 80 - < 100
>= 60 - < 80
>= 40 - < 60
>= 20 - < 40
>= -20 - < 20
>= -40 - < -20
>= -60 - < -40
>= -80 - < -60
>= -100 - <-80
< -100
17/02/2015
resolution: 25x25 km


TEMPERATURE SUM
from : 16 October 2014
to : 15 February 2015
Deviation:
Year of interest - LTA
Base temperature: 0
Unit: degree days (Celsius)
>= 100
>= 80 - < 100
>= 60 - < 80
>= 40 - < 60
>= 20 - < 40
>= -20 - < 20
>= -40 - < -20
>= -60 - < -40
>= -80 - < -60
>= -100 - <-80
< -100
17/02/2015
resolution: 25x25 km


RAINFALL
Cumulated values
from : 01 January 2015
to : 15 February 2015
Year of interest (YOI)
Unit: mm
>= 0 - < 10
>= 10 - < 20
>= 20 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150 - < 200
>= 200 - < 250
>= 250 - < 300
>= 300 - < 400
>= 400 - < 500
>= 500
17/02/2015
resolution: 25x25 km


RAINFALL
Cumulated values
from : 01 January 2015
to : 15 February 2015
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
17/02/2015
resolution: 25x25 km


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 January 2015
to : 15 February 2015
Year of interest (YOI)
Rain (mm) > 5
Unit: days
= 0
1 - 3
4 - 6
7 - 11
12 - 16
>= 17
17/02/2015
resolution: 25x25 km

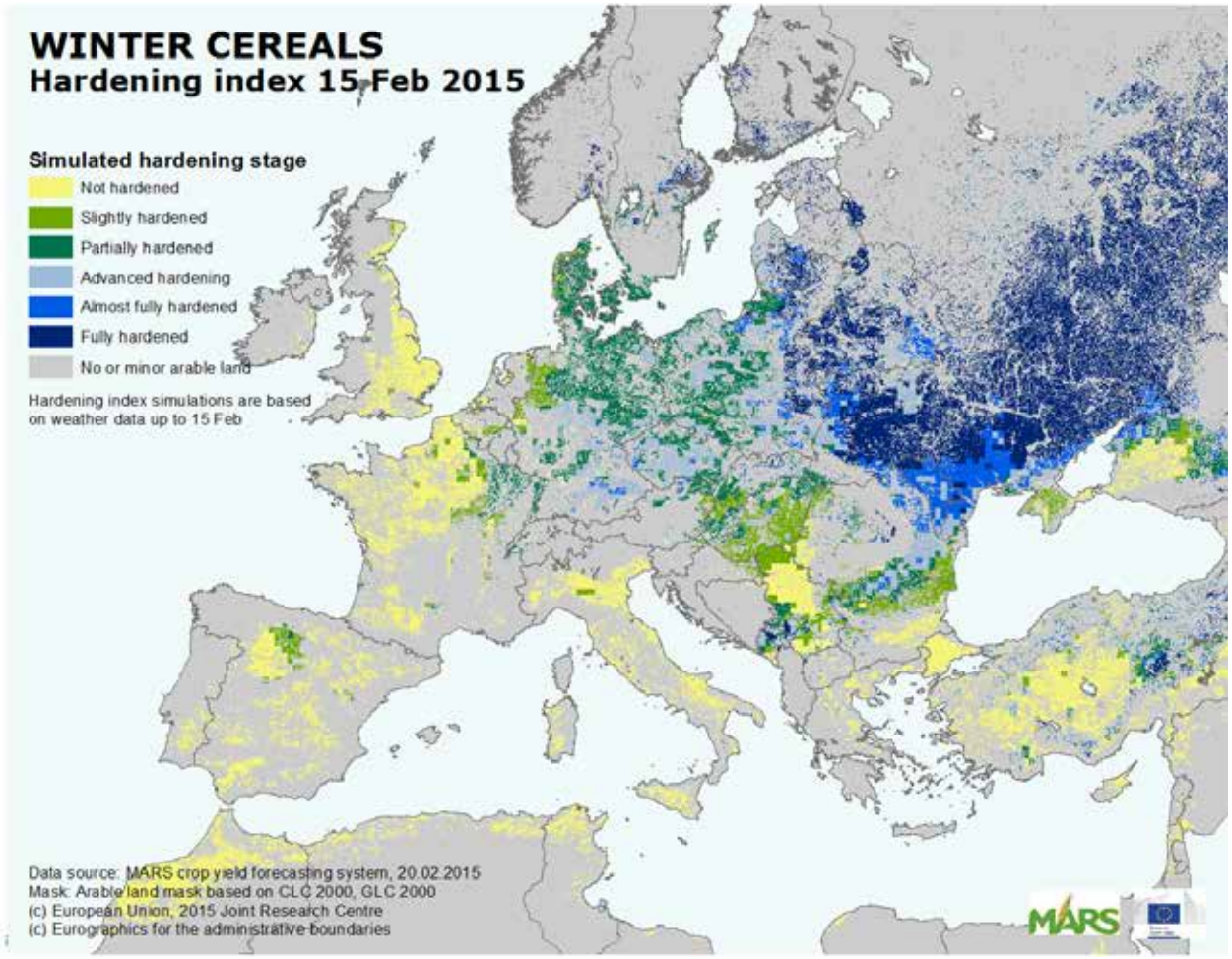

NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 January 2015
to : 15 February 2015
Deviation:
Year of interest - LTA
Rain (mm) > 5
Unit: days
> 15
10 - 15 : wetter in
5 - 10 : YOI
2 - 5
=0 - 2
no difference
-2 - < 0
-5 - -2
-10 - -5 : dryer in
-15 - -10 : YOI
19/02/2015
resolution: 25x25 km

2. Frost-kill analysis

Lower-than-usual hardening continues in western and central Europe. A moderate increase in frost tolerance is indicated in the region between eastern France and the western border of Russia. No significant frost-kill damage had occurred in the EU by mid-February.

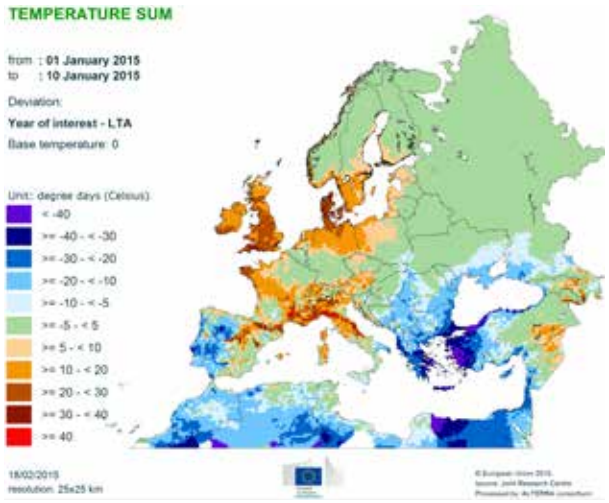
Model simulations indicate continued lower-than-usual hardening in western and central Europe, but this situation improved slightly as of mid-January. Hardening is a bio-physiological process of winter cereals that occurs when, in response to cold conditions, the crops transform cellular starch into sugar, thus gaining low-temperature tolerance which helps them to survive the harsh winter conditions. A moderate increase in frost tolerance is indicated in the region between eastern France and the western border of Russia. Nevertheless, winter crops are only slightly or partially hardened in north-eastern France, northern Germany, Denmark, western Poland, Hungary and northern Bulgaria. Advanced hardening has been simulated in southern Germany, the Czech Republic, Slovakia and most of Romania, whereas full or almost full hardening was reached in eastern Poland, Ukraine, Belarus, the Baltic States, Sweden, Finland, and most of Russia (aside from the area between the Black Sea and the Caspian Sea). By contrast, the winter crops in the United Kingdom, most of the Iberian Peninsula, France, and the Mediterranean region have developed practically no low-temperature tolerance.

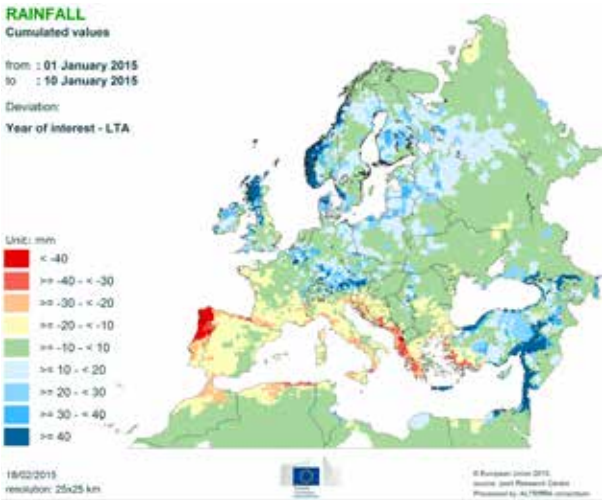
For the EU, our frost-kill model to date suggests only local and limited frost-kill crop damage in Bulgaria, Romania, Hungary and Poland. However, the north-eastern regions of Ukraine, and especially southern Russia, appear to be considerably affected by frost kill. These regions were affected by severe frosts until mid-January, when the snow cover was inadequate to protect the crops, which were vulnerable due to their weak establishment as a consequence of insufficient rains and dry soil conditions during the start of the winter cropping season.

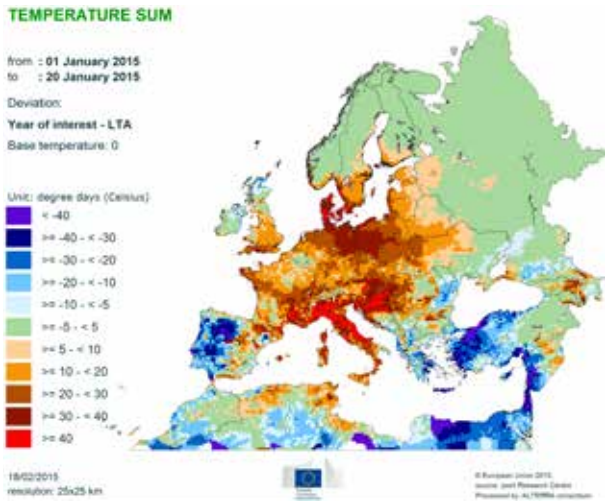


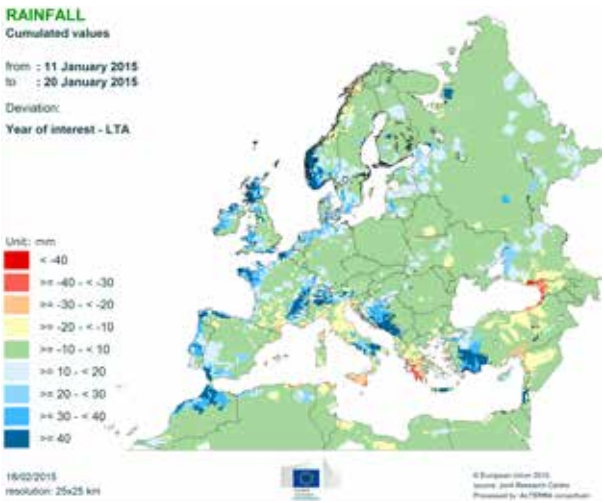
Atlas maps

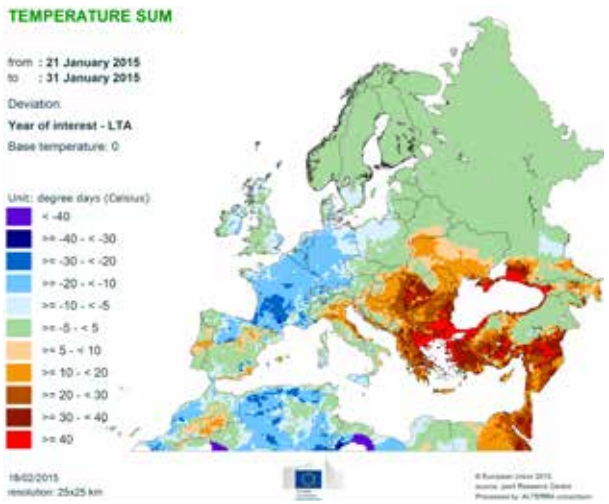
Temperatures and precipitation

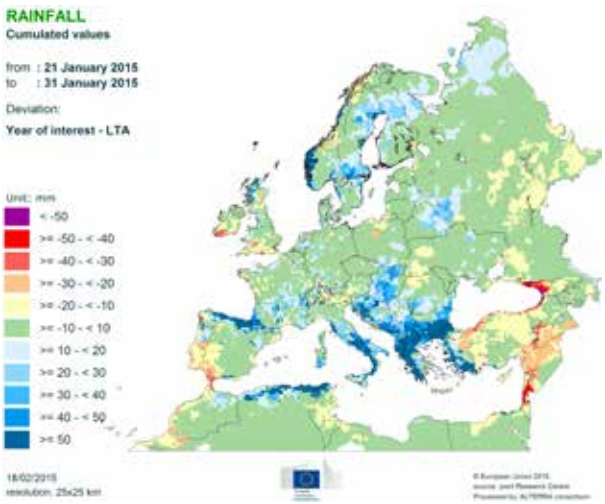


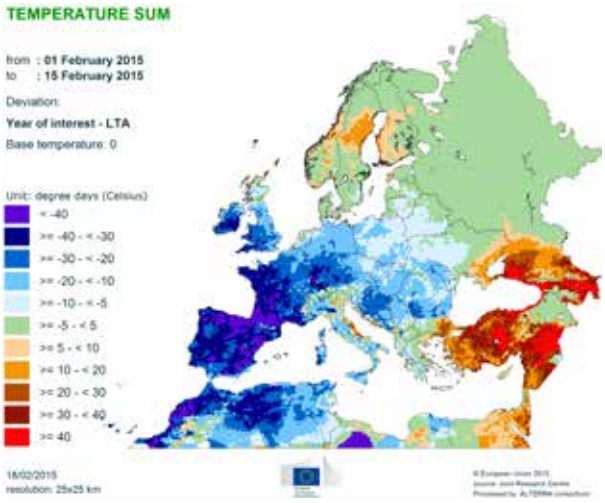


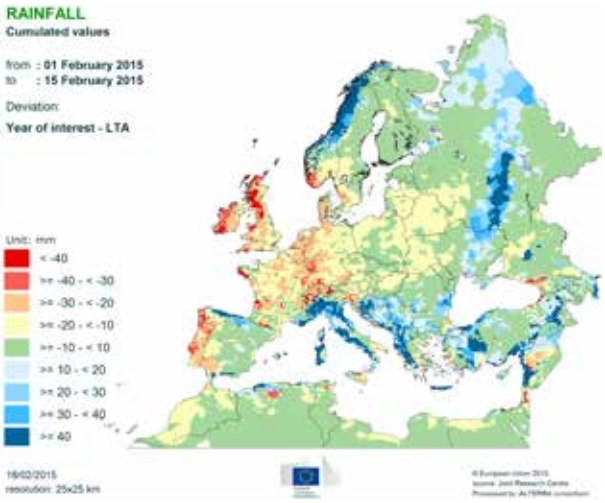


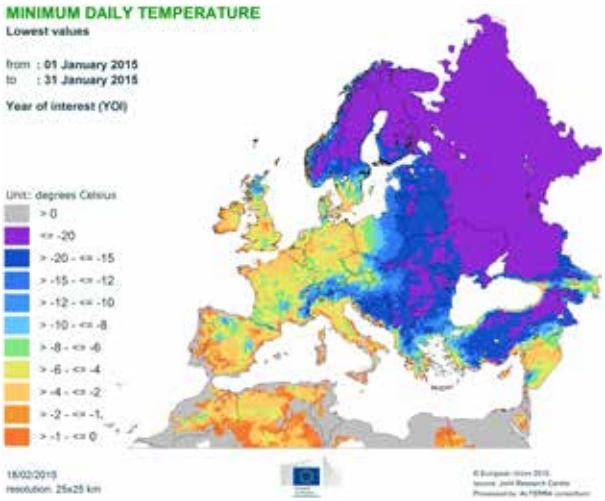


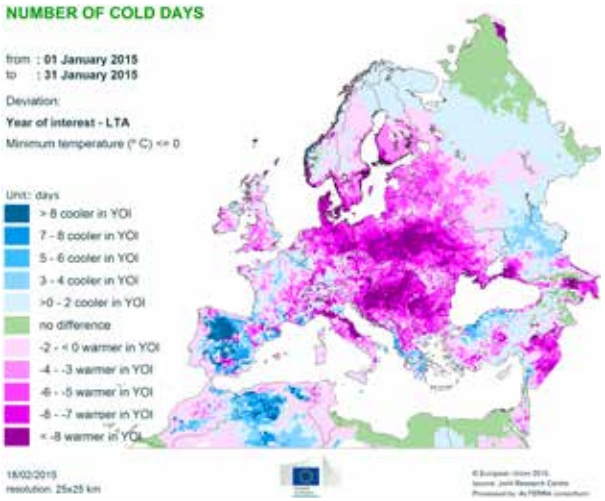


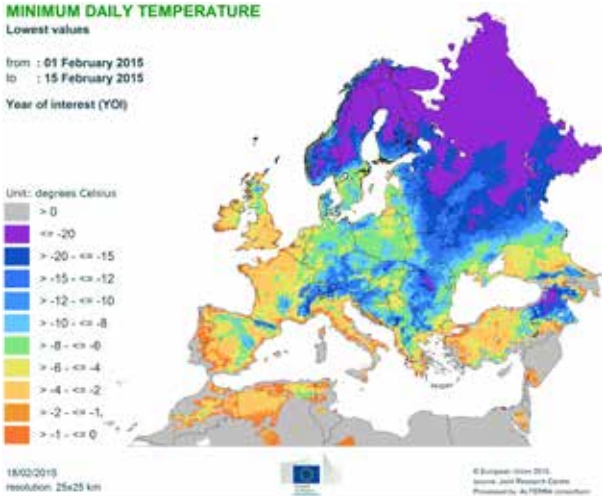


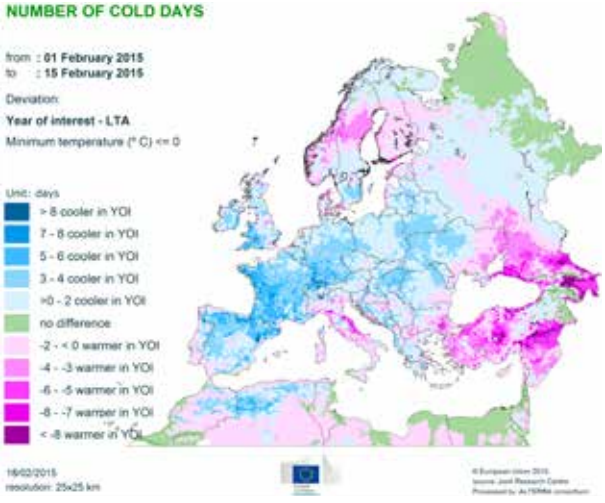

TEMPERATURE SUM
from : 01 February 2015
to : 15 February 2015
Deviation:
Year of interest - LTA
Base temperature: 0
Unit: degree days (Celsius)
< -40
>= -40 - < -30
>= -30 - < -20
>= -20 - < -10
>= -10 - < -5
>= -5 - < 5
>= 5 - < 10
>= 10 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40
18/02/2015
resolution: 25x25 km


RAINFALL
Cumulated values
from : 01 February 2015
to : 15 February 2015
Deviation:
Year of interest - LTA
Unit: mm
< -40
>= -40 - < -30
>= -30 - < -20
>= -20 - < -10
>= -10 - < 10
>= 10 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40
18/02/2015
resolution: 25x25 km


MINIMUM DAILY TEMPERATURE
Lowest values
from : 01 January 2015
to : 31 January 2015
Year of interest (YOI)
Unit: degrees Celsius
> 0
<= -20
> -20 - <= -15
> -15 - <= -12
> -12 - <= -10
> -10 - <= -8
> -8 - <= -6
> -6 - <= -4
> -4 - <= -2
> -2 - <= -1
> -1 - <= 0
18/02/2015
resolution: 25x25 km


NUMBER OF COLD DAYS
from : 01 January 2015
to : 31 January 2015
Deviation:
Year of interest - LTA
Minimum temperature (° C) <= 0
Unit: days
> 8 cooler in YOI
7 - 8 cooler in YOI
5 - 6 cooler in YOI
3 - 4 cooler in YOI
>0 - 2 cooler in YOI
no difference
-2 - < 0 warmer in YOI
-4 - -3 warmer in YOI
-6 - -5 warmer in YOI
-8 - -7 warmer in YOI
< -8 warmer in YOI
18/02/2015
resolution: 25x25 km


MINIMUM DAILY TEMPERATURE
Lowest values
from : 01 February 2015
to : 15 February 2015
Year of interest (YOI)
Unit: degrees Celsius
> 0
<= -20
> -20 - <= -15
> -15 - <= -12
> -12 - <= -10
> -10 - <= -8
> -8 - <= -6
> -6 - <= -4
> -4 - <= -2
> -2 - <= -1
> -1 - <= 0
18/02/2015
resolution: 25x25 km


NUMBER OF COLD DAYS
from : 01 February 2015
to : 15 February 2015
Deviation:
Year of interest - LTA
Minimum temperature (° C) <= 0
Unit: days
> 8 cooler in YOI
7 - 8 cooler in YOI
5 - 6 cooler in YOI
3 - 4 cooler in YOI
>0 - 2 cooler in YOI
no difference
-2 - < 0 warmer in YOI
-4 - -3 warmer in YOI
-6 - -5 warmer in YOI
-8 - -7 warmer in YOI
< -8 warmer in YOI
18/02/2015
resolution: 25x25 km

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MARS Bulletins 2015

Date	Publication	Reference
26 Jan	Agromet analysis	Vol. 23 No 1
23 Feb	Agromet analysis	Vol. 23 No 2
23 Mar	Agromet analysis and yield forecast	Vol. 23 No 3
27 Apr	Agromet analysis, remote sensing and yield forecast	Vol. 23 No 4
26 May	Agromet analysis, remote sensing, yield forecast and pasture analysis	Vol. 23 No 5
22 Jun	Agromet analysis, remote sensing, yield forecast, pasture update and rice analysis	Vol. 23 No 6
27 Jul	Agromet analysis, remote sensing and yield forecast	Vol. 23 No 7
24 Aug	Agromet analysis, remote sensing and yield forecast	Vol. 23 No 8
21 Sep	Agromet analysis, remote sensing, yield forecast and pasture update	Vol. 23 No 9
26 Oct	Agromet analysis, remote sensing, yield forecast and rice analysis	Vol. 23 No 10
23 Nov	Agromet analysis, yield forecast and sowing conditions	Vol. 23 No 11
14 Dec	Agromet analysis	Vol. 23 No 12

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*MARS stands for Monitoring Agricultural Resources

Technical note:
The long-term average (LTA) used within this bulletin as a reference is based on an archive of data covering 1975–2013.

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